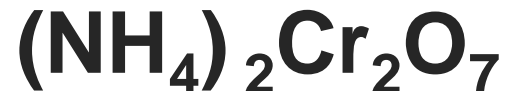


Bell Work

19-Jan-18

Name all of these and give the formula weights (masses)



Objective:

You will KNOW what a mole is

You will be able to convert from grams to moles

- Know how to calculate molar mass
- Convert between grams and mole

MOLE

The mole is a unit of measurement, like
a ton or a dozen

Ton = 2000 of something

Dozen = 12 of something

1 Mole = 6.02×10^{23} of something



<http://youtu.be/TEl4jeETVmg>

The Mole and Molar Mass

Q: Why don't we simply stick with units like grams, nanograms (ng), kilograms (kg), etc.?

A: Moles give us a consistent method to convert between atoms/molecules and grams



MOLAR MASS

The mass of 1 mole of a compound is called *molar mass*

Molecular Mass (amu) = Molar Mass (grams/ mole)

Molecular Mass of H_2O = 18 a.m.u.

Molar Mass of H_2O = 18 g/mol

MOLAR MASS

**Molecular Mass (amu) = Molar
Mass (grams/ mole)**

Molecular Mass of $\text{CO}_2 = 44 \text{ a.m.u.}$

Molar Mass of $\text{CO}_2 = ? \text{ g/mol } 44\text{g/mol}$

**What are the molar masses of -
 NaCl , O_2 , and $\text{Pb}(\text{NO}_3)_2$?**

Molar Mass

Molar Mass: The weight in grams of 1 mole of an element.

What the molar mass of oxygen: 15.99g/mol

What about: Cl?

Formula Mass: The weight in grams of 1 mole of a compound.

What is the Formula mass of H₂O: 18g/mol

What about CO₂ and HC₂H₃O₂

MOLES TO GRAMS

Multiply number of moles by molar mass

#mol of Y x molar mass = grams of Y

$$2 \text{ moles H}_2\text{O} \times \frac{18\text{g H}_2\text{O}}{\text{mole H}_2\text{O}} = 36\text{g H}_2\text{O}$$

PRACTICE

How many grams of the following?

2 moles HCl \rightarrow ? grams HCl (find M.M. HCl first)

3.5 moles KNO₃ \rightarrow ? grams KNO₃

2.4 moles lead (II) hydroxide \rightarrow ? grams

Practice

What is the mass of 1 mole (molar mass) of:

- | | | |
|---------------------------|-----------------------------|--------------------|
| 1. H_2 | 2. $\text{Mg}(\text{OH})_2$ | 3. CO_2 |
| 4. NH_4Cl | 5. CuSO_4 | 6. AgNO_3 |

Convert from grams to moles, or moles to grams

7. How many moles is 12.5 g of magnesium hydroxide?
8. How many moles is 1.46 g of hydrogen gas (H_2)?
9. How many grams are in 4.3 moles of ammonium chloride?

Reaction Type Prediction



Lead (II) chloride reacts with lithium sulfate to produce lead (II) sulfate and _____

Carbon tetrahydride reacts with oxygen to produce...?

Nitrogen trihydride reacts with hydrochloric acid to produce ammonium chloride

In Class

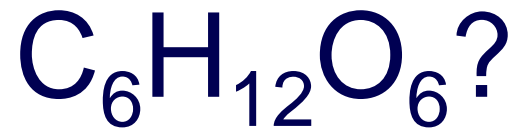
Page 196 problem #28

Read 198-203 problems #33-37

Due 21-Jan-16

Bell Work

What is the formula mass (g/mol) of glucose



If there are 10g of glucose how many moles would there be?

EQ: What responsibilities do I have as an American to my country, community, family and self?

Objective:

You will easily be able to convert between moles, atoms, and grams of a single substance.

- You will know when to use Avogadro's number

Avogadro's Number

A set number of atoms with a mass in grams (g) equal to the mass of one atom in atomic mass units (amu).

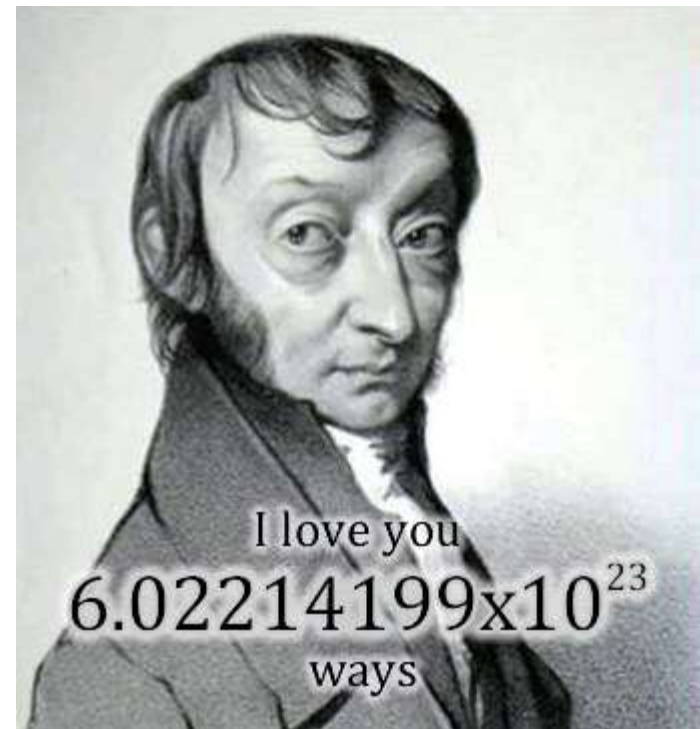
Avogadro's number =

6.02×10^{23} atoms/ molecules/ particles

WHAT'S A MOLE

A mole is the quantity of anything that has the same number of particles found in 12.000 grams of carbon-12

**That number of
particles is
Avogadro's
Number:
 6.02×10^{23}**



MOLE

If I have a mole of Mr. Golden's then I have a 6.02×10^{23} Mr. Golden's.

If I have a mole of pens then I have 6.02×10^{23} pens

Conversion factor:

6.02×10^{23} some things (atoms, etc)

mole

PRACTICE

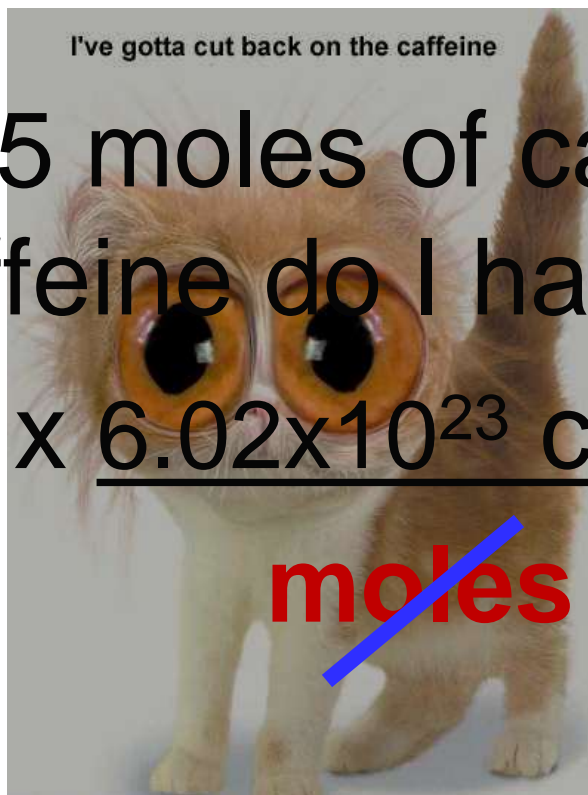
If Mr. 2 Chainz has 2 moles of chainz
then he has:

$$2 \text{ moles} \times \frac{6.02 \times 10^{23} \text{ chainz}}{\text{moles}} = ?$$

1.2×10^{24} chainz



PRACTICE



If I have 4.5 moles of caffeine how much caffeine do I have?

$$4.5 \text{ ~~moles~~ } \times \frac{6.02 \times 10^{23} \text{ caffeine}}{\text{moles}} = ?$$

$$2.71 \times 10^{24} \text{ caffeine}$$

ATOMS TO MOLES

Atoms/ molecules → moles

of **atoms** X moles = # of moles

6.02x10²³ **atoms**

Moles → Atoms/ molecules

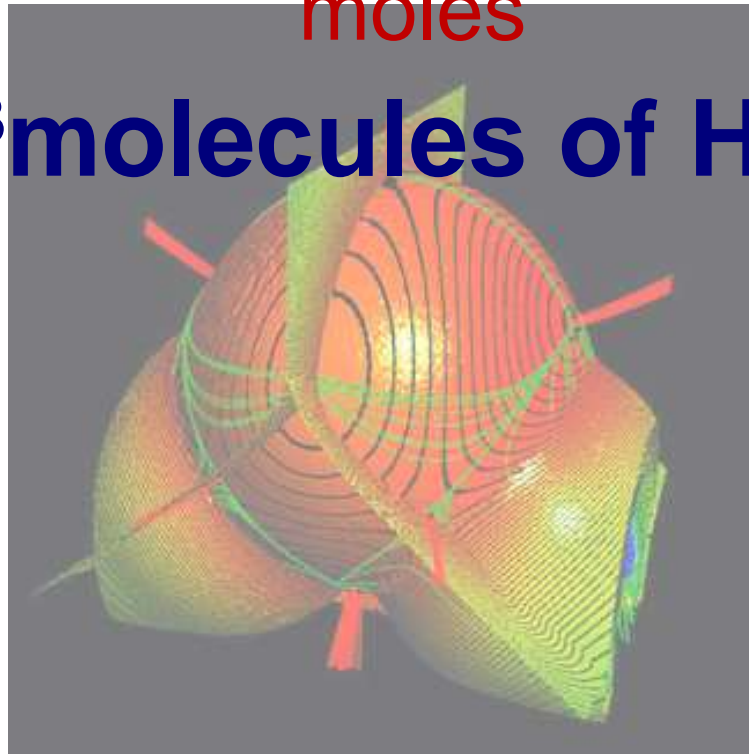
of **moles** X 6.02x10²³ atoms = # of atoms
moles

PRACTICE

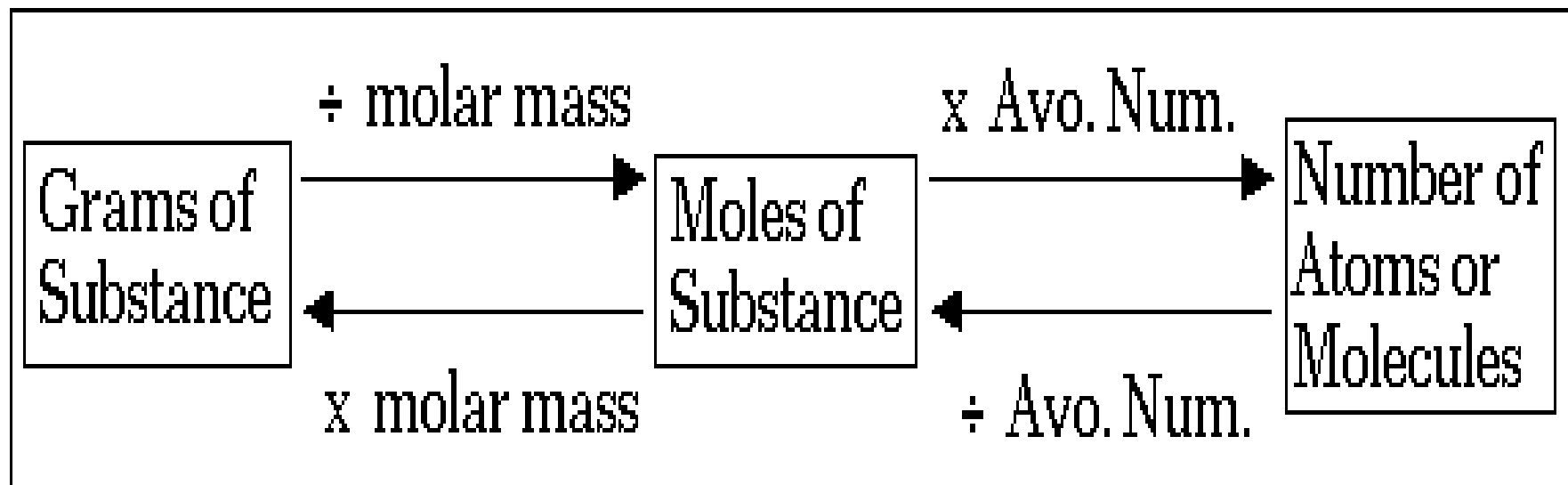
If I have 1.5 moles of H_2O then I have:

$$1.5 \text{ moles} \times \underline{6.023 \times 10^{23} \text{ molecules of } \text{H}_2\text{O}} = ?$$

$$9.03 \times 10^{23} \text{ molecules of } \text{H}_2\text{O}$$



Grams $\leftarrow \rightarrow$ *Moles* $\leftarrow \rightarrow$ *Atoms*



Molecules, Atom, Grams, and Mole Calculation Practice

In your lab groups you will work out **Every** example stepwise as a team

-each person need to have all of the examples and practice problems w/ all work for credit shown

As a team Write out assigned problems and correct set up to solve on poster paper

~~Bell Work~~

A modern cars combustion engine produces energy through the combustion of gasoline and/ or ethanol plus various other additives, for purposes of ease assume the reaction between gasoline and oxygen produces 105.0g of carbon dioxide every 30s while driving at highway speed.

Using this data, how many molecule of carbon dioxide are produced every 30s?
Every hour?

Agenda

Mole Bean lab

Objective:

You will **KNOW** how the value of a mole was calculated and what a mole is!!!

EQ: After a win on a sports field or an academic assignment what is your next responsibility in order to repeat on the next challenge?

Mole Bean Lab

Follow all directions.

The formulas you need are on the bottom of the first page

Return all of the beans to the correct beaker at the stock table when you are finished.

Agenda

Finish Mole Bean lab

Continue to work of example practice problems for:

$g_A \leftrightarrow \text{mol}_A \leftrightarrow \text{molecules}_A$

Objective:

You will **KNOW** how the value of a mole was calculated and what a mole is!!!

EQ: After a win on a sports field or an academic assignment what is your next responsibility in order to repeat on the next challenge?

Mole Bean Lab

Follow all directions.

The formulas you need are on the bottom of
the first page

Finish Part 2

~~*Bell Work*~~
~~*Jan-201X*~~

If you have 40g of glucose, $\text{C}_6\text{H}_{12}\text{O}_6$,
how many moles is that?

Bell Work

22-Jan-2018

- i. What is the difference between molar mass and number of molecules?
- ii. Suppose you have 2.5×10^{32} atoms of Bromine (Br), how many grams of Br_2 do you have?
- iii. On a scale of 1-3 how confident are you in your ability to solve this problem?

1= not confident, 3 = confident
- iv. Is it possible to solve this problem using only one step (conversion factor)?

Bell Work

23-Jan-2018

Suppose you have 2.5×10^{32} atoms of Bromine (**Br**), how many grams of Br_2 do you have?

1. On a scale of 1-3 how confident are you in your ability to solve this problem?

1 = not confident, 3 = confident

2. Is it possible to solve this problem using only one step (conversion factor)?

Objective:

You will Practice using ratios in a chemical formulas during mole calculations.

EQ: After a win on a sports field or an academic assignment what is your next responsibility in order to repeat on the next challenge?

Mole Of Chalk Lab

No Pre lab 😊!

Draw any picture on the Black Paper. The pictures must be school appropriate!

Use the same scale before and after

Do Not Use Up All of Your Chalk

Bell Work

3-Feb-2017

A clam shell found on the beach was weighed out to 20.0 grams. How many moles of Oxygen (O) is the shell composed of?
Grams of Oxygen (O)?



Hint: Clam shells are made of calcium carbonate

Objective:

You will KNOW how to use ratios in a chemical formulas during mole calculations.

EQ: After a win on a sports field or an academic assignment what is your next responsibility in order to repeat on the next challenge?

Mole Of Chalk Lab

Post lab calculations

Molecules, Atom, Grams, and Mole Calculation Practice

As a team Write out assigned problem and correct set up to solve on poster paper

Ex. How many grams would 5.0×10^{31} molecules of H_2O weigh?

$$\frac{5.00E^{31} \text{ molecules of } H_2O}{1} \times \frac{1 \text{ mol } H_2O}{6.022E^{23} \text{ molecules } H_2O} \times \frac{18.0g H_2O}{1 \text{ mol } H_2O} = 1.4955E^9 g H_2O$$

Molecule \rightarrow
mole conversion

Mole \rightarrow Mass
Conversion

PRACTICE

Convert 3.2 moles of sand (SiO_2) to molecules of sand.

How many molecules of NaCl are there in 5 moles of NaCl?

If you have 4.5×10^{56} molecules of CO_2 how many grams do you have?

And More

There are 5.4million bees on a bee ranch, how many moles of bees are there?

How many grams of KOH are there in 1.673×10^{23} molecules of KOH?

How many molecules of HgO are there in 1.25g of HgO?



Practice

How many grams of CaCO_3 are there in 5.67×10^{13} atoms of CaCO_3 ?

How many atoms of MgCrO_3 are there in 4.8g of MgCrO_3 ?

PRACTICE

5.0×10^{20} molecules of $\text{Cl}_2 \rightarrow$ moles $\text{Cl}_2 \rightarrow$ g Cl_2

3.5×10^{21} molecules of $\text{NaCl} \rightarrow$ moles \rightarrow g NaCl

2.5 g $\text{NaCl} \rightarrow$ moles $\text{NaCl} \rightarrow$ molecules NaCl

5 g $\text{Cl}_2 \rightarrow$ moles $\text{Cl}_2 \rightarrow$ molecules Cl_2

PRACTICE

How many molecules of Oxygen are in 4 grams of O_2 ?

How many grams of Hydrogen are in 7.03×10^{23} molecules of H_2 ?

How many molecules of NaCl are in 9g of NaCl?

How many grams of KBr are in 5.034×10^{25} molecules of KBr?

Objective

You will be assessed on your knowledge of
writing correct chemical formulas AND
writing correct balance chemical equations

BELL WORK



What is the mole ratio of methane (CH_4) to water in the balanced equation?

If you combusted 454.0g of methane how many mole would that be?

How many moles of water would be created? (recall mole ratio)

Objective

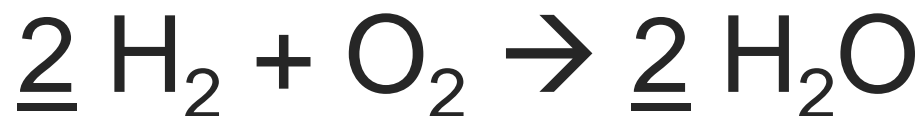
You will complete the mole of chalk lab and finish and remaining work form last week

You will begin to see the use of coefficients in a balance equations

EQ: How does being confident in only part of a very large number impact results

MOLAR RATIO

The ratio of moles of compounds in a chemical equations \rightarrow coefficients



So for every 2 moles of H_2 there are 2 moles of H_2O and 1 mole of O_2

MOLAR RATIO



So for every 2 moles of NaOH there are 2 moles of NaCl and 1 mole of FeCl₂ and Fe(OH)₂

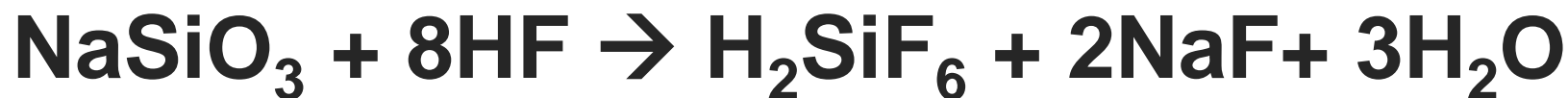
GIVE THE MOLAR RATIOS



H_2S to HF & F_2 to SF_4



O_2 to H_2SO_4 & SO_2 to H_2O



NaSiO_3 to H_2O & HF to NaF

And Some More ☺

How many atoms of C_3H_8 are present in 451 g C_3H_8 ?

What is the mass of 1.20×10^{12} molecules of carbon dioxide?

And Some More!!



Write the molar ratios for N_2 to H_2 and NH_3 to H_2 in fraction form.



Write the molar ratios for O_2 to SO_3 and O_2 to SO_2 in fraction form.



Write the molar ratios for PCl_3 to Cl_2 and PCl_3 to PCl_5 in fraction form.

BELL WORK

Balance the following equations:



**If 3.5 grams of iron (III) oxide is used
what mass of Fe^{+3} atoms were present at
the beginning of the reactions?**

**What is the ratio of Fe to Fe_2O_3 in the
balanced equations?**

EQ: How does being confident in only part of a very large number impact results

Objective:

You will be able to show how to use dimensional analysis to convert between grams, atoms, and molecules while using mole ratios.